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(54) Embossing device for road markings

(57) A profiling roller for applying a profile to a road marking, comprising a hollow cylinder (1) having an outer surface (2) and an inner surface (3), and wherein there is provided at least one aperture (6) which extends between the outer and the inner surfaces (2,3). In use, reflective beads (10) are distributed onto a freshly-laid road marking (9), and the cylinder (1) is then passed over the road marking (9) so as to push the beads (10) into the road marking (9) and to apply a profile (8) to the road marking (9), thereby assisting water drainage and hence wet night visibility of the road marking.

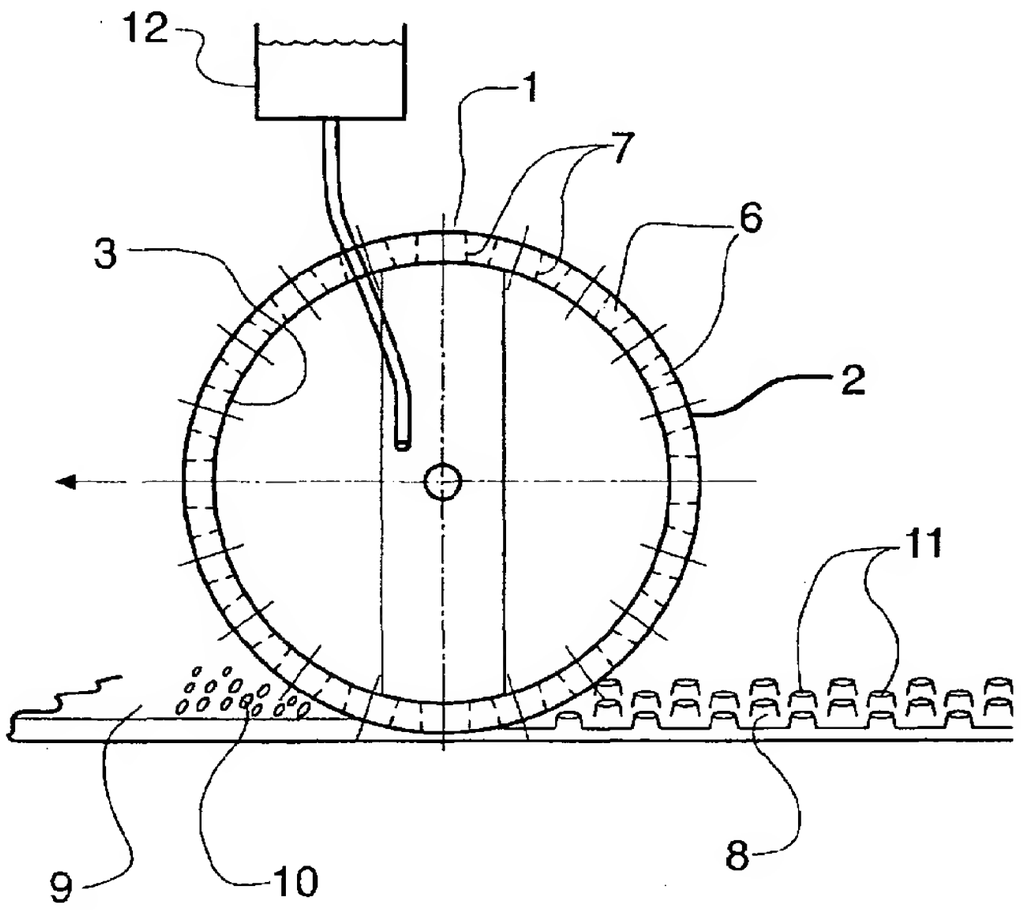

Fig. 2

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Description

[0001] This invention relates to an apparatus for applying an embossed profile to a road or pavement or similar marking in order to provide improved wet night visibility.

[0002] Road or pavement markings such as centre lines, hazard lines and lane markings generally are based on thermoplastic materials or solvent- and water-based paints. Such markings may also be applied in off-road locations, such as car parks and the like, and the expression "road marking" as used hereinafter is to be understood to encompass all such markings in any location.

[0003] Thermoplastic road markings have the advantage of a relatively short hardening time, and may therefore be driven over not long after being applied. This allows traffic disruption to be kept relatively low. The marking is applied by heating the thermoplastic mixture and applying it in a controlled manner onto a prepared road surface by way of a hot spray, screeding or extrusion process. In order to ensure good night visibility of the road marking, small glass beads may be mixed in with the marking mixture and/or applied to the surface of the mixture after it has been applied, but before it has hardened. These glass beads have predetermined refractive and reflective properties, and are designed to reflect light from vehicle headlamps back towards the driver. While this provides good night visibility in dry conditions, even relatively light rain can drastically reduce the visibility of the road marking by submerging the glass beads which protrude from the surface of the marking, thus altering the refractive and reflective properties of the surface as a whole.

[0004] In order to overcome this deficiency, it is known to generate a profile in the road marking after it has been laid by running a solid profiled roller or wheel over the road marking before it has hardened. Such a system is disclosed, for example, in EP 0 655 533 (Prismo Limited) and WO 94/16149 (The Rainline Corporation). It is also known, from DE 30 29 909 (Lackfabrick Knackstedt & Fricke KG), to scatter glass beads over a thermoplastic road marking after it has been applied to a road surface and subsequently to apply a profile by rolling a solid patterned cylinder over the marking before it has hardened.

[0005] The prior art methods suffer from the disadvantage that pockets of air can become trapped in the indentations which form the profile of the roller or cylinder as this is passed over the still-soft thermoplastic road marking. This can lead to an unsatisfactory profile being applied to the road marking, and can cause significant line spread and create a bow wave of thermoplastic material in front of the roller or cylinder. In addition, the still-soft thermoplastic road marking tends to stick to the surface of the roller or cylinder.

[0006] According to a first aspect of the present invention, there is provided a profiling roller for applying a profile to a road marking, comprising a hollow cylinder having an outer surface and an inner surface and wherein there is provided at least one aperture which extends between the outer and the inner surfaces.

[0007] According to a second aspect of the present invention, there is provided a method of applying a profile to a road marking, wherein a profiling roller comprising a hollow cylinder having an outer surface, an inner surface and at least one aperture extending between the outer and the inner surfaces, is rolled over the road marking after said road marking has been laid but before it has hardened.

[0008] In preferred embodiments, the at least one aperture comprises a plurality of holes which are drilled or otherwise formed in the cylinder. The holes may be generally circular, or may take other shapes, including oval, triangular, rectangular, rhombic, regular or irregular polygonal, trapezoidal, parallelogrammic or any combination thereof. The holes may be relatively small, i.e. there may be at least 50 holes, and in some embodiments at least 100 holes, spaced over the cylinder. It is also envisaged that the at least one aperture may take the form of one or more slits which may extend in any direction across the surface of the cylinder, and which may be straight or curved or any other suitable shape.

[0009] The profiling roller of the present invention has a number of advantages over the solid rollers of the prior art. Firstly, unlike with a solid profiled roller, no air pockets are formed at the apertures of the roller of the present invention when this is rolled over a still-soft road marking. Because air can pass through the apertures, it is easier to deform the road marking so as to generate a relatively high profile pattern. This means that the roller of the present invention need not be as heavy as the prior art rollers; indeed, because the roller of the present invention is hollow, most embodiments will anyway tend to be lighter than an equivalent solid roller. Furthermore, because the roller of the present invention is generally relatively light, the soft road marking will spread to a lesser degree, and the problem of creating a bow wave of thermoplastic material in front of the roller during use is ameliorated. This spreading effect is also reduced because the thermoplastic material will tend to be squeezed through the at least one aperture rather than over the edges of the road marking as laid.

[0010] The edges of the at least one aperture are advantageously chamfered so that the size of the at least one aperture is greater on the outer surface of the cylinder than on the inner surface. In this way, any reflective beads (made, for example, from glass, polycarbonate or other transparent plastics or ceramic materials) which have been scattered on the road marking prior to passage of the roller will tend to become embedded on the sides of the resultant projecting parts of the road marking, which is where the reflective beads are at their most effective. Furthermore, reflective beads will not tend to become embedded in the tops of the projections, as happens with a solid roller, thereby leading to improved

skid resistance.

[0011] In order to reduce adhesion of the still-soft thermoplastic material to the roller, cooling water may be supplied to the inside of the cylinder. This cooling water will tend to drain out through the at least one aperture, thereby helping to reduce the hardening time of the road marking and thereby permitting the road marking to be driven over a relatively short time after it has been profiled.

[0012] Advantageously, the thermoplastic road marking is a hot-applied product and comprises a thermoplastic resin binder which may be plasticised and modified with predetermined polymeric additives. The binder may also contain one or more of pigment, extender, reflective beads and aggregate. In order to regulate the flow characteristics of the thermoplastic road marking during application, it may also contain additives to control melt flow behaviour and thixotropic properties.

[0013] The thermoplastic road marking, generally supplied from a boiler mounted on an applicator vehicle, is first applied to the road surface to a thickness of 1 to 10mm, and preferably to a thickness of 2 to 5mm. The method of application may comprise a hot spray, a screeding or an extrusion process, and may use stencil means where necessary or convenient.

[0014] In preferred embodiments of the present invention, the hollow cylinder is made out of metal into which the at least one aperture has been drilled or cut. Suitable metals include mild steels, stainless steel and aluminium, although other metals may be found to be satisfactory. Alternatively, the hollow cylinder may be made out of a heat-resistant plastics material. The width of the cylinder is generally somewhat greater than the width of the road marking in order to keep the cylinder in contact with the road marking even when passing through a bend. Typically, the width of the cylinder may be around 30cm, but may be from 5cm up to 50cm or even wider for certain applications. The cylinder may typically have a diameter in the range of 10 to 20cm, although diameters in the range of 5 to 50cm or even wider may be useful in some applications.

[0015] The roller of the present invention may be used in a motor-driven applicator vehicle, such as that disclosed in the present applicant's European patent application 0 655 533 A, or may be incorporated in a hand-driven applicator, such as that disclosed in the present applicant's U.K. patent application no. 9720147.9. For the avoidance of doubt, the disclosures of each of these prior patent applications is incorporated into the present application by reference.

[0016] For a better understanding of the present invention, and to show how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

FIGURE 1 is a front elevation of a profiling roller in the form of a hollow cylinder;
FIGURE 2 is a cross-section through the roller of Figure 1 as it is being used to apply a profile to a road marking;
FIGURE 3 is a front elevation of a profiling roller having slot-shaped apertures; and
FIGURE 4 is a front elevation of a profiling roller having apertures in the form of elongated slits.

[0017] Figure 1 shows a hollow cylinder 1 having an outer surface 2 and an inner surface 3. The cylinder 1 is provided with end plates 4, each of which has a central hole 5 through which an axle or other mounting means (not shown) may be passed in order rotatably to secure the cylinder 1 to an applicator vehicle (not shown). The cylinder 1 is provided with a number of apertures 6 which extend between the outer and inner surfaces 2,3. In the embodiment shown in Figure 1, the apertures 6 are circular, but it will be appreciated that the apertures 6 can take any desired shape. The sides 7 of the apertures 6 are chamfered, such that each aperture 6 is larger on the outer surface 2 than the inner surface 3 of the cylinder 1. In the particular embodiment shown, the cylinder 1 has a width of around 30cm, a diameter of around 15cm, and the apertures 6 have a diameter of 1.6cm and a centre-to-centre spacing of 2.6cm, although it is to be understood that other appropriate dimensions may be applied.

[0018] Figure 2 is a cross-section of the cylinder 1 of Figure 1, and shows the cylinder 1 being used to apply a profile 8 to a still-soft thermoplastic road marking 9 just after this has been laid. As the cylinder 1 is rolled along the still-soft road marking 9, the road marking 9 is deformed and at least partly extruded into the apertures 6. In some applications, reflective beads 10 are scattered over the road marking 9 before passage of the cylinder 1, which helps to press the beads 10 into the road marking 9. The chamfered sides 7 of the apertures 6 tend to embed the beads 10 into the sides of the raised parts 11 of the profile 8 without pressing any beads 10 into the tops of the raised parts 11. This means that the beads 10 are well-positioned to ensure good visibility, but present less of a skid hazard. Cooling water (not shown) may be supplied to the inside of the cylinder 1 by way of a water supply 12 so as to reduce adhesion of the road marking 9 to the cylinder 1.

[0019] Figure 3 shows a cylinder 1' similar to the cylinder 1 of Figures 1 and 2, but having apertures 6' in the form of slots, and Figure 4 shows a further alternative cylinder 1" having apertures 6" in the form of elongate slits.

Claims

1. A profiling roller for applying a profile to a road marking, comprising a hollow cylinder having an outer surface and an inner surface and wherein there is provided at least one aperture which extends between the outer and the inner surfaces.

2. A profiling roller as claimed in claim 1, wherein the at least one aperture comprises a plurality of holes.

3. A profiling roller as claimed in claim 2, wherein the holes are of generally circular shape.

4. A profiling roller as claimed in claim 2, wherein the holes are of regular polygonal shape.

5. A profiling roller as claimed in claim 2, wherein the holes are of generally oval shape.

6. A profiling roller as claimed in claim 1, wherein the at least one aperture comprises at least one slit which extends over at least a portion of the surface of the cylinder.

7. A profiling roller as claimed in any preceding claim, wherein the at least one aperture has sides which are chamfered such that the size of the at least one aperture is greater on the outer surface of the cylinder than on the inner surface thereof.

8. A profiling roller as claimed in any preceding claim, wherein the cylinder is made of metal.

9. A profiling roller as claimed in any one of claims 1 to 8, wherein the cylinder is made of a heat-resistant plastics material.

10. A profiling roller as claimed in any preceding claim, wherein, in use, cooling water is supplied to the inside of the cylinder.

11. A method of applying a profile to a road marking, wherein a profiling roller comprising a hollow cylinder having an outer surface, an inner surface and at least one aperture extending between the outer and the inner surfaces, is rolled over the road marking after said road marking has been laid but before it has hardened.

12. A method according to claim 11, wherein reflective beads are scattered onto the road marking before passage of the profiling roller.

13. A method according to claim 11 or 12, wherein cooling water is supplied to the inside of the cylinder.

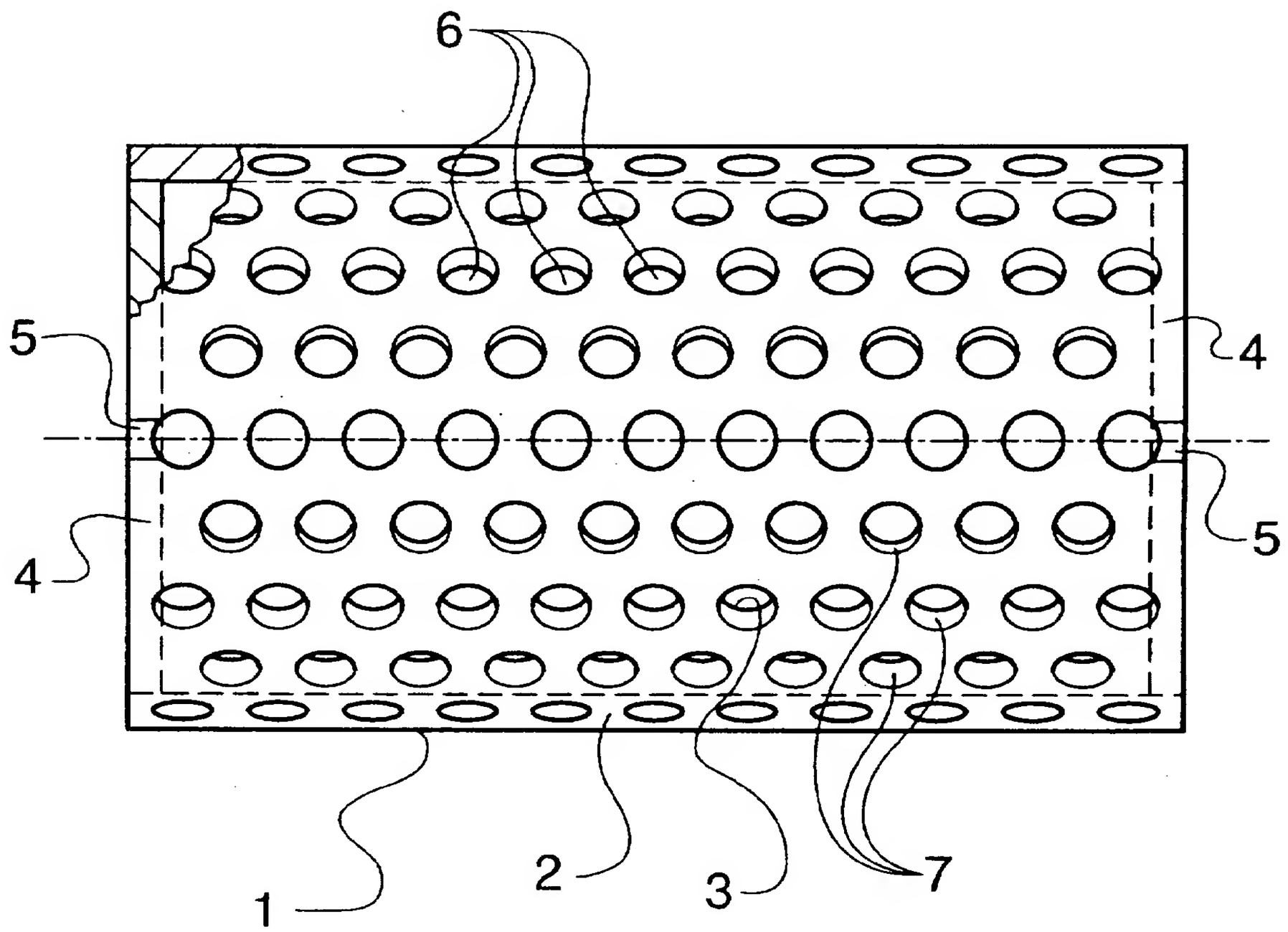

Fig. 1

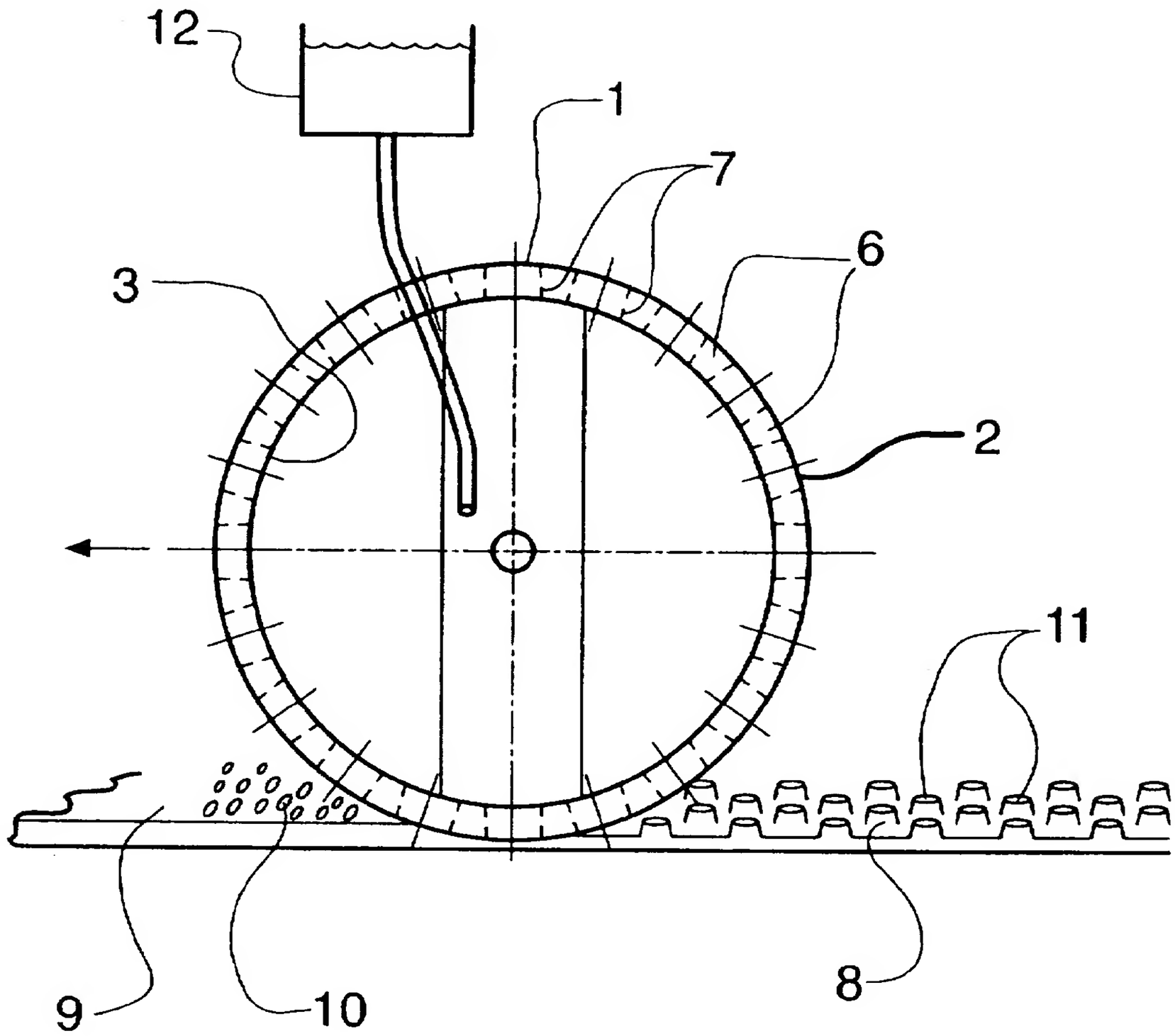

Fig. 2

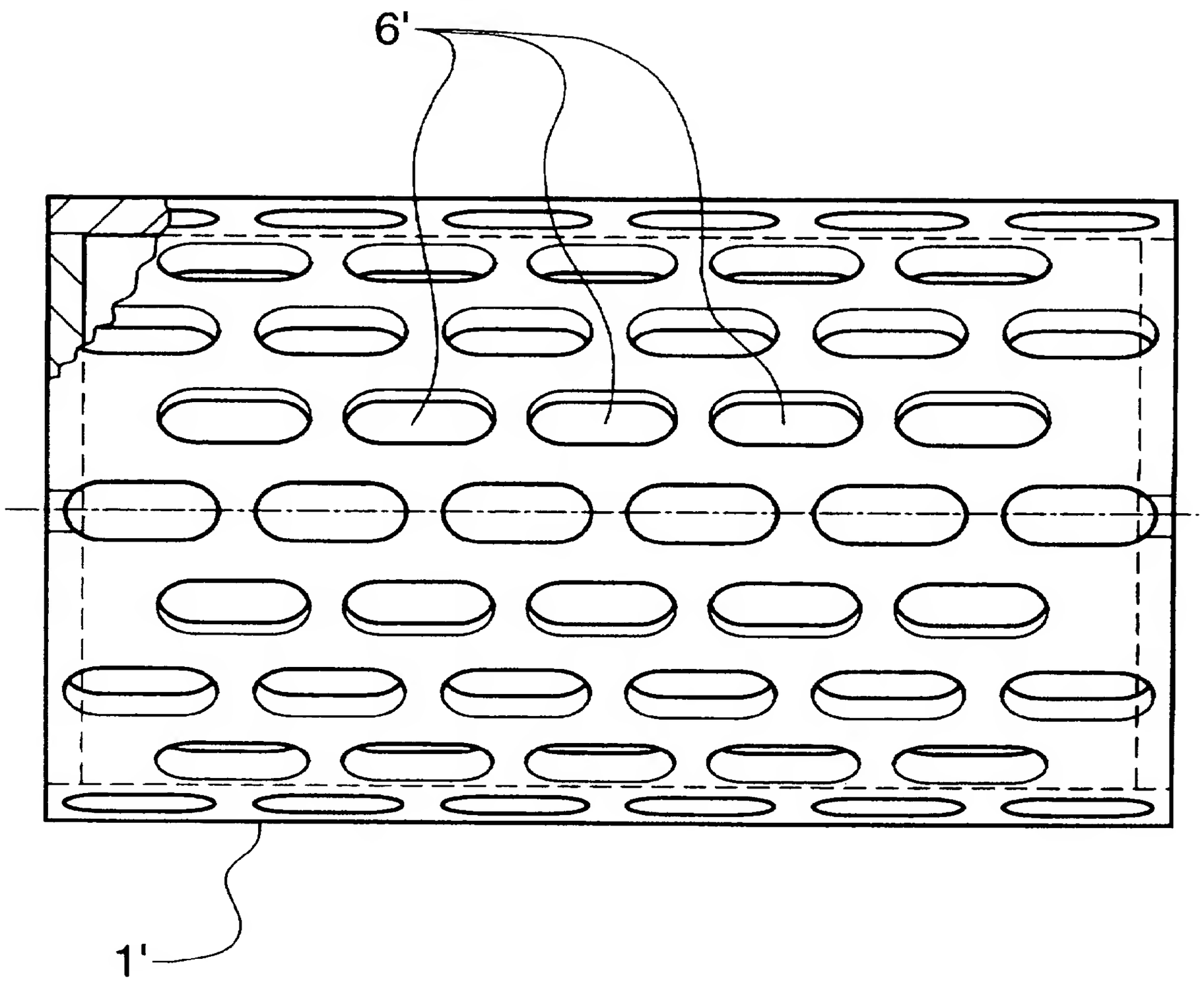

Fig. 3

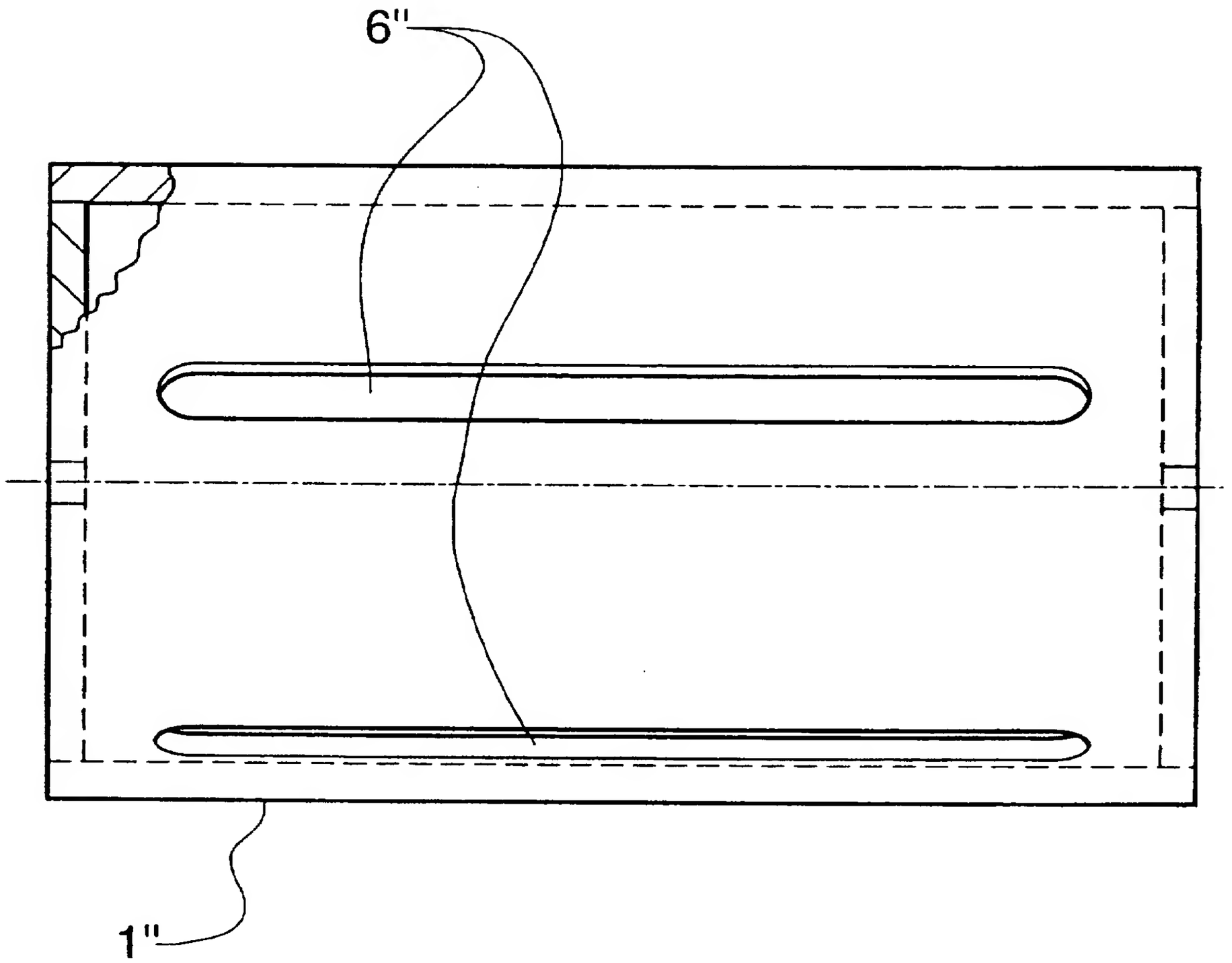

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 98 31 0390

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
D,A	DE 30 29 909 A (LACKFABRIK KNACKSTEDT & FRICKE) 11 March 1982 * the whole document *	1,10-13	E01C23/20
D,A	WO 94 16149 A (RAINLINE CORP) 21 July 1994 * abstract; figures *	1,11,12	
D,A	EP 0 655 533 A (PRISMO LTD) 31 May 1995 * figures *	1,8,11, 12	
A	US 1 626 879 A (SHIDLER) 3 May 1927		
A	US 4 105 354 A (BOWMAN BRADSHAW) 8 August 1978		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

E01C
E01F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29 March 1999	Dijkstra, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 98 31 0390

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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29-03-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3029909 A	11-03-1982	NONE	
WO 9416149 A	21-07-1994	US 5439312 A	08-08-1995
		US 5511896 A	30-04-1996
		AU 687377 B	26-02-1998
		AU 6030694 A	15-08-1994
		EP 0679208 A	02-11-1995
		NZ 261524 A	22-08-1996
		US 5642962 A	01-07-1997
EP 0655533 A	31-05-1995	NONE	
US 1626879 A	03-05-1927	NONE	
US 4105354 A	08-08-1978	NONE	

EPO FORM P0459